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DEVELOPMENT AND USE OF STANDARDS FOR GRADE, COLOR, AND CHARACTER OF AMERICAN COTTON LINTERS[1]

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THE STANDARDS

The United States standard grades for American cotton linters have been available since August 1, 1926,[2] but no effort has been made under the provisions of the Cotton Standards Act to enforce their use in interstate or foreign commerce. The present use of these standards, therefore, may be taken as an indication of their utility. A recent survey [3] showed that from a production standpoint approximately 75 percent of the annual crop is now handled on the basis of the standard grades, either in the control of the quality of the linters produced or in connection with their sale. So successful have the oil mills been in controlling the quality of linters by means of the standards, that some mills have been able to sell 95 percent of their total output on the two subgrades that are in greatest demand by consumers, and at substantial premiums.

One of the major uses of linters is in the manufacture of mattresses, of which the Federal Government, to meet the needs of

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[1] This publication is a revision of and supersedes Miscellaneous Publication No. 10, The Establishment of Standard Grades for American Cotton Linters.

[2] U. S. Department of Agriculture, Bureau of Agricultural Economics. official standards of the united states for american cotton linters. U. S. Dept. Agr., Bur. Agr. Econ. Serv. and Regulat. Announce. 94, 9 pp. 1925.

[3] Fuchs, V. R. quality of cotton linters produced in the united states, season 1933-34. U. S. Dept. Agr., Bur. Agr. Econ. 1935. [Mimeographed.]

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the Army, Navy, Marine Corps, and Government hospitals, schools, and penal institutions, is a large purchaser. All Federal and many State contracts for mattresses now describe the quality of the linters to be used, in terms of the standards. The result has been that the quality of mattresses now being secured for public institutions is superior to that secured previous to the adoption of the standards.

The size of the annual crop of cotton linters follows in a general way the size of the cotton crop, but it does not necessarily do so since there is a wide margin between the amount of linters that have to be removed per ton of seed for efficient oil and cake recovery and the total amount that can be removed. As a result, the size of the crop of cotton linters may vary considerably in accord with the market demand. For example, the removal of an average of 70 pounds of linters per ton of seed is usually sufficient for an efficient separation of hulls and meats and the optimum recovery of oil, but nearly twice that quantity of linters will be recovered per ton of seed if the price warrants the readjustment of the delinting apparatus.

COTTON LINTERS DEFINED

Cotton linters is that residue of vegetable hair found on the seed of all varieties of American cotton after ginning. Until methods were devised for removing it economically, it seriously interfered with the efficiency of the recovery of cottonseed oil and materially reduced the value of the residual cake.

The ever-increasing number of channels of consumption for linters have naturally resulted in refinements and restrictions as to the quality of the linters used by each, particularly since linters compete with certain forms of cotton, mill wastes, and wood pulp. The demands for specific qualities of linters in industry and the experiences with linters during the World War demonstrated the need for standard measures of quality.

REQUEST FOR STANDARDS FROM THE INDUSTRY

Linters is an excellent source of munitions cellulose. Its production is localized at a comparatively few points—the cottonseed-oil mills. As the source of linters was so well centralized, rules were immediately issued, when the United States entered the World War, governing the "cutting" or recovery of linters; and the entire crop was requisitioned for war uses. The crop of 1916–17 amounted to 1,273,345 bales, valued at $45,193,000, and that of 1917–18 to 1,080,802 bales, valued at $26,604,000.[4] To meet war requirements, and in the absence of any standards to serve as a guide, the intensity of the delinting processes was increased without any realization of the probable results. At the sudden termination of hostilities, the War Department found that it had on hand enormous quantities of linters of a great confusion of qualities, with little peace-time value. The War Industries Board immediately requested that a study of the situation be made with a view to establishing standard grades. Studies were promptly undertaken by the United States Department of Agriculture, and as a result four tenative grades were proposed. In the meantime, however, the supply on hand had been disposed of by the War Department, and the crop had dropped to 422,226 bales, worth only $3,506,000. Interest in the subject was lacking for the time being.

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[4] U. S. DEPARTMENT OF COMMERCE, BUREAU OF THE CENSUS. COTTON PRODUCTION AND DISTRIBUTION SEASON OF 1924–25. U. S. Dept. Com., Bur. of the Census. Bull. 158, 65 pp. 1925.

With the crop of 1923–24 the production of linters increased to 642,384 bales, worth more than $22,000,000, and the industry itself revived the question, which took the form of a resolution passed by the Interstate Cotton Seed Crushers' Association in annual convention in New Orleans, May 1924. In this resolution the Secretary of Agriculture was requested to renew the study of the commodity with a view to the establishment of standard grades. The studies were renewed in July 1924 and were conducted along three lines: (1) The requirements and preferences of the consumers of linters; (2) the methods of grading and marketing linters used by dealers, brokers, and agents; and (3) the methods of delinting or recovering linters and the possibilities of controlling the quality of linters by mechanical adjustments of the delinting apparatus. These studies were immeasurably facilitated by the hearty cooperation that was given by all branches of the industry—producers, middlemen, and consumers. To assist the Department in the work, the Interstate Cotton Seed Crushers' Association appointed the following committee on the standardization of linters: A. K. Burrow, Memphis, Tenn., chairman; T. J. Kidd, Birmingham, Ala.; Edgar L. Pearson, Houston, Tex.; S. W. Wilbor, Paris, Tex.; P. H. Lamar, Atlanta, Ga.; and J. H. Turberville, Jackson, Miss.

This committee was supplemented by A. A. Taylor, Lockland, Ohio, representing the Better Bedding Alliance of America, and G. D. Robson, Memphis, Tenn., representing the American Cotton Linters Association.

DEFINITIONS OF TERMS

These studies led to two conclusions: (1) That linters is a commixture of two types of fibers—the long, usually soft or flaccid fibers that have escaped removal during ginning and the very short, more deeply colored fuzz fibers that are found more or less densely matted about the seed coat at the base of the long fibers of American upland varieties of cotton; (2) that there are four factors influencing the grade or value of linters—staple, foreign matter, color, and character.

STAPLE

In describing linters the word "staple" is used with reference to the different blends or the preponderance of one or the other of the two types of fiber of which linters is composed. Although the degree of intensity of the delinting process and the variations in the total residual fiber in different lots of seed make possible all degrees in the mixtures or blends of these two types of fiber, each special channel of consumption is very definitely limited to comparatively narrow variations in the blends.

FOREIGN MATTER

Foreign matter in linters consists of broken leaves, motes, sticks, dirt, and particles of the seed coat or hull that have been rasped off by the delinting saws and the quantity present is influenced by the care exercised in cleaning the seed. The nature of the foreign matter varies in the different geographic sections of production. Foreign matter in linters produced in the Southeast is likely to consist chiefly of very fine particles of the seed coat, known as pepper trash. The particles of seed coat or hull in linters produced in the Mississippi Valley States are usually larger than in linters produced in the Southeastern States. Linters produced in Texas and Oklahoma are usually rather free of pepper trash but frequently contain more large pieces of hull, broken leaves, etc., than are found in linters from other sections.

COLOR

The normal or natural colors of linters are various shades of olive and buff. During exposure to light the olive coloring sometimes shades off through a light buff or cream to a deep buff. In trade parlance these colors are usually spoken of as green, reddish, and cream. Olive prevails in southeastern and valley linters and light buff to buff in western and southwestern linters. Natural colors are easily bleached. Other colors are sometimes found in linters. They are usually the result of weather damage or fungous staining of the fiber, either while it is still on the undelinted seed or after it has been delinted and baled, through exposure of the bale. Such colors might be called unnatural colors and are difficult or impossible to bleach.

CHARACTER

In describing the quality of linters, three types called character are recognized and are designated as Western, Valley, and Southeastern. Character in linters is a term used to cover a combination of three elements—maximum length and uniformity in length of the long fibers, softness or harshness (resiliency) of the mass of fibers as a whole, and smoothness or neppiness. Character in linters is apparently sectional and is probably influenced by soil and seasonal conditions and by the prevailing varieties of cotton planted. Linters of Western character are harsh, resilient, usually neppy, and the long fibers are comparatively short and regular in length. Linters of Valley character are soft. The long fibers are the longest found in linters, but usually are irregular in length. Valley-character linters are frequently neppy, but not so distinctly neppy as linters of Western character. Linters of Southeastern character compare with linters of Valley character in softness, but are smoother and less neppy. The long fibers are intermediate in length between those of Western and Valley characters and are more uniform in length. In general, both Valley and Western characters of linters appear to be a homogeneous mixture or blending of the long fibers and fuzz. Linters of Southeastern character are distinctly different in this respect from linters produced in the other two regions, having a filamentous appearance as if made up of fine laminations of the long fibers and the fuzz.

Although both the color of linters and the character are usually associated with certain sections of production, at times linters of either the character or the color usually associated with one section are produced in the other sections.

CUTTING

Reginning, or delinting, is frequently spoken of as cutting.

FIRST CUTS

Cuts ranging from 20 to 50 pounds per ton of seed have generally become known as first cuts or first-cut linters.

MILL RUNS

Cuts ranging from about 35 to 100 pounds or more per ton of seed are known as mill runs or mill-run linters.

SECOND CUTS

After a first cutting, especially if not over 50 pounds per ton of seed have been removed in the first delinting, the seed are frequently passed through the delinting machine a second time. The linters thus recovered are known as second cuts. The total quantity of linters cut ranges from about 30 pounds to as high as 200 pounds per ton of seed.

HULL FIBERS

It has not been found generally economical to attempt a complete denuding of the seed preparatory to crushing. A heavy-cut mill run or a second cut is usually sufficient for practical purposes. This leaves a portion of the fuzz still attached to the seed coats or hulls when the seed are decorticated and the kernels and hulls are separated. The demand for cellulose has been so active in recent years that a number of mills have installed special apparatus for recovering the fiber from the hulls, after decortication. Linters of this type of fiber have become known generally as hull fiber.

ESTABLISHMENT OF THE STANDARDS

On the basis of the information at its disposal the Department of Agriculture prepared seven tentative grades. These grades were based chiefly on the different blends of the two types of fibers. In each grade were combined samples of such different blends as are usually baled together in well-managed mills, as are within the possibilities of control by mechanical adjustments of the delinting apparatus, and as meet the special requirements of consumption. Each grade was made up of 12 samples in the normal colors of linters. The three sectional characters were represented by the same positions in each box, and foreign matter was shown of the usual sectional nature and in an amount not easily removed and usually to be found in linters that is carefully cut and baled.

In this manner each box of 12 samples representing a single grade of linters was made to embody, as nearly as possible, the wishes of the consumers and the possibilities of the producers. One grade, for instance, illustrates linters desirable for absorbent cotton, surgical dressings, spinning, high-grade battings, etc. Another illustrates linters suitable for certain nitrating purposes, and another, the most desired form of linters for munitions. Each meets the requirements for particular types of mattress feltings.

These seven boxes of samples representing a new plan for the grading of linters were presented by a representative of the Department of Agriculture to a special meeting of the linters standardization committee held in Memphis, Tenn., on January 9, 1925. All members of the committee were present, together with the representatives of the Better Bedding Alliance and the American Cotton Linters Association. After a thorough discussion, the plan presented for the grading of linters was approved; and later, after the positions of two or three samples had been interchanged, the boxes as a whole were also unanimously approved as representing the grades of linters.

On January 13–15, 1925, the boxes representing the proposed grades were exhibited and discussed at the annual convention of the Better Bedding Alliance of America, held in Chicago, Ill. This convention passed a resolution approving the boxes as standard grades.

Following this the boxes were presented to the convention of the Interstate Cotton Seed Crushers' Association, held in New Orleans May 13–15, 1925. After a thorough discussion this convention approved the grades and recommended their adoption as official standards.

With its work so well indorsed, the Department proceeded with the legal phases of establishing the proposed grades as part of the official standards of the United States. This was accomplished by an order of the Secretary of Agriculture dated July 7, 1925, establishing them immediately as tentative standards and giving public notice that on August 1, 1926, they would become the official standard grades of the United States for American cotton linters.[5]

Since that form of linters known as hull fiber is composed almost exclusively of the fuzz type of fiber, most of which is itself broken or cut, it is not possible to put up permanent samples of it in the form of physical types. Therefore, the order of the Secretary simply describes such linters in the following terms: "American cotton linters, the fiber of which is below that shown in grade 7 herein established, shall be designated as hull fiber."

PRACTICAL FORMS OF THE STANDARDS

The construction of the boxes containing the samples of physical types representing the standard grades is simple and yet is so comprehensive as to permit of a very wide range of subdivision for trading purposes. In each box representing a grade the samples are placed in three rows of four samples each. Samples 1, 2, 3, and 4 in the top tier of each box represent the character and foreign matter of Southeastern linters. Samples 5, 6, 7, and 8, the middle tier, represent Valley linters. The bottom tier, samples 9, 10, 11, and 12, represent Western linters. Samples 1, 5, and 9 of each box represent the blends, for each character, having the greatest proportion of long fibers included in each grade; and samples 4, 8, and 12 represent the blends having the smallest portions of long fibers in each grade. In adjacent grades, samples 4, 8, and 12 of the higher grade are the equal, respectively, of samples 1, 5, and 9 of the next lower grade. Therefore, in each character there are 28 samples in all, 6 of which are duplicates, leaving 22 samples to represent the entire range of blends of fiber, from that having the highest proportion of long fiber to that having the largest proportion of fuzz. These 22 samples are divided into 7 groups. Each group represents a grade.

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[5] U. S. Department of Agriculture, Bureau of Agriculture Economics. See footnote 2.

SUBDIVISIONS OF THE OFFICIAL GRADES

This arrangement of samples and characters enables the official grades to be subdivided for trading purposes (1) directly into the three characters, and (2) whenever expedient, by reference to the number of the sample and grade down to individual samples or combinations of samples.

The representations of the three characters for each grade were assembled into a single box primarily for the convenience of traders, but this grouping should be advantageous to producers because of the occasional seasonal occurrence of a particular character outside of its normal region. It should be of value also to consumers, as all may be advised fully as to the qualities of linters available.

ESTABLISHMENT OF BOARD OF COTTON LINTERS EXAMINERS

On December 11, 1926, the regulations of the Secretary of Agriculture under the Cotton Standards Act were amended so as to provide the same Government facilities and service for cotton linters as were available for cotton. Under this amendment a board of cotton linters examiners was established in Washington, D. C., consisting of three members (G. S. Meloy, chairman, F. S. Hubbard,[6] vice chairman, and V. R. Fuchs), with power to certificate the grade and character of such samples and bales of linters as might be submitted for the purpose.

Provision was made for the licensing of competent persons to grade and classify linters and to certificate the grade or the class in accordance with the official standards of the United States for American cotton linters.

EXPOSITOR TYPES AUTHORIZED

On March 25, 1927, a meeting was held in Memphis, Tenn., at the call of the linters standardization committee of the Interstate Cotton Seed Crushers' Association, to which were invited representatives of the Mattress Manufacturers Association, the chemical users of linters, linters dealers' associations and exchanges, and cottonseed crushers. The purpose of the meeting was to discuss the sufficiency and the increased utilization of the standard grades.

During the conference it was brought out that both the construction of the grades and the method of preparation of the samples were entirely new to the industry. The Department of Agriculture was requested to furnish holders of copies of the standard grades with small loose samples illustrating the characters and staples as represented in the standard grades so that they might better acquaint themselves with the standards. This the Department agreed to do with the understanding that the samples so furnished would be used for informative purposes only, without official status, and would not be used or substituted for the standards.

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[6] On June 13, 1933, the Secretary of Agriculture designated V. R. Fuchs vice chairman (Hubbard deceased) and appointed A. M. Agelasto as a member of the board.

In accordance with this agreement the following amendment to the regulations relative to the classification of American cotton linters was issued: "Three expositor types, illustrating the staples and characters of linters as embraced in each of the grades nos. 1 to 6, inclusive, of the official standards of the United States for American cotton linters, will be supplied to each purchaser of copies of said official standards. To the extent that facilities permit, additional expositor types will be furnished to any such purchaser of copies of said standards, or to any other person, at the rate of $1 each ($3 for each grade), f. o. b., Washington, D. C., for shipment within the continental United States, and $1.25 each ($3.75 for each grade), delivered to destination, for shipment outside the continental United States."[7]

ESTABLISHMENT OF STANDARDS FOR COLOR OF AMERICAN COTTON LINTERS

In the public notice of July 7, 1925, establishing standard grades for American cotton linters, three of the four principal factors of value in American cotton linters were standardized—that is, characters, staples or blends of fiber, and foreign matter.

At a conference held in Memphis, Tenn., on October 6, 1927, representatives of the linters industry requested that the Department of Agriculture establish standards for the remaining factor of value—color—and that the normal color of linters, as carried in the samples used in constructing the original standard grades, be established as such standards for color of linters.

In accord with this request the Secretary of Agriculture issued public notice dated October 31, 1927, establishing as standards for color of American cotton linters, the colors of the samples contained in the original standards for grade.[8]

ADOPTION OF UNIFORM SUBGRADE TERMS

Previous experience had demonstrated that many bales contained linters of such miscellaneous qualities that it would be impossible to definitely describe their quality; therefore section 9 of the order of the Secretary of July 7, 1925, establishing the standard grades, limited the range of quality that may be described on the basis of the standards to the equal of two adjacent standard grades. The commercial use of the standards soon caused a narrowing and refinement in the range of qualities. The board of cotton linters examiners found it necessary to adopt uniform terms for use in describing the narrow ranges of quality found in single bales of linters when classified on the basis of the standards.

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[7] U. S. DEPARTMENT OF AGRICULTURE, BUREAU OF AGRICULTURAL ECONOMICS. ITEMS RELATING TO THE ADMINISTRATION OF THE UNITED STATES COTTON FUTURES AND COTTON STANDARDS ACTS. U. S. Dept. Agr., Bur. Agr. Econ. Serv. and Regula. Announc. 109, 13 pp., 1928.

[8] U. S. DEPARTMENT OF AGRICULTURE, BUREAU OF AGRICULTURAL ECONOMICS. See footnote 7.

The terms adopted by the board and now used by the trade are as follows:

Bales of linters showing the exact range of variation embraced in any one standard grade are designated by the number of the standard grade. As, U. S. No. 1, U. S. No. 2, etc.

Bales of linters showing the range of variation of any standard grade plus that of the two lower layers of the next higher standard grade, that is, samples 3 and 4, or 7 and 8, or 11 and 12, of the higher grade, according to character, are designated by the grade number of the lower grade with the suffix "Plus." As, U. S. No. 2–Plus, U. S. No. 3–Plus, etc.

Bales of linters showing the range of variation of any standard grade plus that of the two higher layers of the next lower standard grade, that is, samples 1 and 2, or 5 and 6, or 9 and 10, of the lower grade, according to character, are designated by the grade number of the higher grade with the suffix "Minus." As, U. S. No. 1–Minus, U. S. No. 2–Minus, etc.

Bales of linters showing the range of variation only of samples nos. 1 and 2 or 1, 2, and 3; or nos. 5 and 6 or 5, 6, and 7; or nos. 9 and 10 or 9, 10, and 11, according to character, are designated by the standard grade number with the suffix "High." As, U. S. No. 1–High, U. S. No. 2–High, etc.

Bales of linters showing the range of variation only of samples nos. 3 and 4 or 2, 3, and 4; or nos. 7 and 8 or 6, 7, and 8; or nos. 11 and 12, or 10, 11, and 12, according to character, are designated by the standard grade number with the suffix "Low." As, U. S. No. 1–Low, U. S. No. 2–Low, etc.

Bales of linters showing the range of variation only of samples nos. 2 and 3, or 6 and 7, or 10 and 11, according to character, are designated by the standard grade number with the suffix "Short." As, U. S. No. 1–Short, U. S. No. 2–Short, etc.

Bales of linters showing the full range of variation embraced in any standard grade plus the two lower layers of the next higher standard grade as well as the two higher layers of the next lower standard grade, that is, samples 3 and 4, or 7 and 8, or 11 and 12 of the next higher grade, according to character, and samples 1 and 2, or 5 and 6, or 9 and 10 of the next lower grade, as the case may be, are designated by the grade number of the full grade with the suffix "Broad." As, U. S. No. 2–Broad, U. S. No. 3–Broad, etc.

Bales of linters showing the full range of variation embraced in two adjacent grades, are designated by the numbers of the adjacent grades compounded. As, U. S. No. 1–2, U. S. No. 2–3, etc.

Bales of linters showing a range of variation extending into two adjacent grades but within the limits of samples 2, 6, and 10 of the higher grade and samples 3, 7, and 11 of the lower grade depending upon character, are designated by the numbers of the two adjacent grades compounded with the suffix "Short." As, U. S. No. 1–2 Short, U. S. No. 2–3 Short, etc.

Bales of linters which in grade show a variation of fiber greater than the range of two adjacent grades, are designated as "Mixed Packed."

Bales of linters that contain more foreign matter, neps, or other irregularities than shown in the standard grades are designated as "Off grade."

Bales of linters the fiber of which is below that shown in standard grade 7 are designated as "Hull fiber."

Color: The basic color of linters is indicated by the terms Olive and Buff, and the intensity or depth of color is designated by the same terms as are used to describe grade. As "grade 2, color 2 Buff"; or "grade 2, color 3 Olive", etc.

A typical report of the classification of a sample of linters according to the official standards is as follows:

Sample	Grade	Character	Color
105	No. 2	Western	No. 2 Buff

and means that the sample shows the range of variation of fiber of standard grade No. 2, is of standard character Western, and that the color is buff and is equal to the intensity of color of the original standard grade No. 2.

INDUSTRIAL TRADING RULES

At the annual convention of the Interstate Cotton Seed Crushers' Association held in Memphis, Tenn., May 25–27, 1927, the linters standardization committee brought in its report, which included a complete set of trading rules recognizing, and based upon the use of, the standard grades. These trading rules are the first of their kind covering transactions in linters. Their incorporation in this report seems warranted, particularly since the Government itself, Federal and State, is a large purchaser of linters. The trading rules adopted by this convention as amended by its successor, the National Cottonseed Products Association, are as follows:

1. In all contracts for specific grades, including subgrades, of cotton linters the grades of the official standards of the United States for American Cotton Linters shall be used, or implied, unless contracts are based on actual samples or types.

2. For contract purposes each of the Government grades from number one to number seven, inclusive, may be subdivided into "High", "Middle", and "Low." The "High" shall be the first two samples in the box. "Middle" shall be the second and third samples in the box. "Low" shall be the third and fourth samples in the box.

Any contract based on Government grades shall permit tender of 5 percent of bales of the next lower subgrade, if offset by 5 percent of bales of the next higher subgrade.

(Example: A contract for Government grade Number Two shall permit tender of 5 percent of bales of the subgrade "High Number Three", if offset by 5 percent of bales of the subgrade "Low Number One.")

Any contract based on a subgrade of Government grades shall permit tender of 5 percent of bales of the next lower subgrade, if offset by 5 percent of bales of the next higher subgrade.

(Example: A contract for "Low Number Two" shall permit tender of 5 percent of bales of the subgrade "High Number Three", if offset by 5 percent of bales of the subgrade "Middle Number Two.")[9]

3. In all contracts for specific grades, or subgrades, of cotton linters, the delivery shall contain the full range of variation of staple and color of the standard grade or subgrade in approximately equal parts.

4. Sectional character should be specified, otherwise grading shall be done without reference to character.

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[9] Rule 130. NATIONAL COTTON SEED PRODUCTS ASSOCIATION TRADING RULES, 1935.

PREPARATION AND DISTRIBUTION OF COPIES OF STANDARDS

Copies of the standard grades for American cotton linters are prepared by the Department of Agriculture and sold to the trade in the same manner as are copies of the cotton standards. The price has been fixed at $5 a grade. Because of the vicissitudes of use including the probability of alterations in these copies, the life of the copies as official copies has been limited to 1 year from the date of issue.

To facilitate export business in American cotton linters the Department has placed copies of the standards, so that they may be available for reference with the following: The Liverpool Cotton Association, Ltd., Liverpool, England; the Syndicat du Commerce des Cotons au Havre, Havre, France; the Bremer Baumwollbörse, Bremen, Germany; and the American Embassy, London, England.

Stama

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